
PCRSP's Aflatoxin Philosophy, History, and Present Programs

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Peanut Collaborative
Research Support Program
(CRSP)



USAID
FROM THE AMERICAN PEOPLE

Aflatoxin Background

- Hazards
 - Cancer
 - Immune suppression & epidemics
 - Nutritional interference
- Management Strategies
 - Prevention of contamination
 - Detection of AF
 - Crop/commodity management
 - Removal of contamination
 - Preventing bio-exposure

Food/Feed System Situations

- Large Scale and Regulated
 - Developed Countries
 - Trade based
 - Advanced Infrastructure
 - Capital intensive
- Small Scale and Unregulated
 - Informal markets
 - Subsistence
 - High Food Insecurity
- Animal Farms



Management Models

- Neglect (Developing Country Model - Historic)
 - Consumer has the burden of risk
 - Food is cheaper
 - Health costs may be higher
- Regulation (Developed Country Model - Historic)
 - Burdens producer and processor
 - Consumer is passive but pays economically
 - Fails in food insecure situations
- Prophylactic Neutralization (Animal Farm Model)
Contamination accepted but damage prevented by treatments
 - Consumer has cheaper foods and is responsible for safety.
 - Requires education and processing

Trade perspective

- Only 4% of peanut production is traded where AF standards are applied – EU, USA, Japan etc
- Trade is highly competitive and many developing country prices are comparable to world prices.

PCRSP History/Program Evolution 1983-98

- Agricultural intervention perspective motivated by trade and health
 - Contamination prevention through
 - Genetics and basic study
 - Environmental issues
 - Preprocessing Management
 - Removal/segregation
 - Quality assurance
 - Training and equipment focused on supporting programs

Results 1983 - 98

- Basic Knowledge
- Putative Syn-Genes for resistance
- Methods to prevent contamination
- Methods for removal
 - Pre-consumption sorting
 - Post-consumption enterosorption

BUT Little Adoption and Less Attention except for:

1. Livestock and Novasil (enterosorption)
2. Trade focused enterprises

Earlier Achievements/Impacts

- Gene discovery for resistance via GM
- Termite links
- Aflatoxin Binding Minerals
 - Novasil used in 10% of animal feeds world wide.
- Removal technologies
 - Philippines increased trade

Challenges to Management-focused Research Impact

- Food systems (informal – subsistence- scale)
- Food insecurity – poverty
- WHO excluded mycotoxins from priorities
 - Ministries of Health focused on infectious diseases and developed country preoccupations
 - HCC perception
- Ministries of Agriculture focus on trade

An Alternative Objective

- Minimizing Biological Exposure
 - Economic minimization of contamination
 - Economic incentives
 - Educated buyers
 - Food Quality/Health risks understood
 - Prevent uptake of unavoidable contamination
 - Food additives
 - Processes to neutralize mycotoxins

Program Evolution from 1998

- Understanding failure to adopt technologies
 - Social sciences -& economics
- Policy focused effort
 - Document exposure RATHER than contamination
 - Document health consequence of exposure
 - Immunity and Nutrition
 - Infectious diseases epidemiology
- Food additive interventions

Program Evolution (continued)

- Capacity
 - Effort to enable trade and quality certification.
 - Exposure estimation needs new developing country-feasible exposure surveillance technologies
- Technologies
 - Novasil evaluation

Results

- New paradigm for protection based on enterosorption by safe products
- 30% of a potential 43% of burden of disease is now know to be modulated through AF promotion of
 - Underweight (17%)
 - HIV (10%)
 - Vitamin A (3%)

2001-07 Aflatoxin Focus/Roles

- Detection focused on forecasting
- Preventing contamination
- Decontamination
- Preventing Exposure /Additives
- Economics and Gender
- Human Consequences
- UGA
- U WI & FAMU
- UGA
- TAMU & OKSU
- AUBURN & VT
- UAB, TAMU, UGA

Accomplishments

2001-2009

- Extent of AF exposure in Ghana
- Economic Understanding of AF in Africa
- Immunity Affects in Humans
- Nutritional Effects in Humans
- Novasil safety proven (phase 2a)
- Risk modeling
- Exposure Detection Improved

Accomplishments (continued)

- Immune impacts documented
- Malaria correlation documented
- HIV immune impairment synergized

Future

- Exposure Screening methods
- Detection / sorting methods
- Management
- Risk Forecasting
- GM development
- Human intervention with Novasil
 - Disease epidemiology

Future Goals

- Novasil for acute interventions
- Novasil as a therapy for chronic-AF promoted HIV progression and transmission?
- Exposure surveillance network.
- Ability to easily breed AF-resistant peanuts